

# California Education Learning Lab

## Frequently Asked Questions

The purpose of the Learning Lab is to improve learning outcomes and to close equity and achievement gaps, using learning science and adaptive learning technologies in online or hybrid college-level lower division courses.

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## 1. Why learning science?

“The goal of learning sciences is to better understand the cognitive and social processes that result in the most effective learning, and to use this knowledge to redesign classrooms and other learning environments so that people learn more deeply and more effectively.”

-- R. Keith Sawyer, Washington University

Learning science is the study of how human learning takes place. Interdisciplinary in nature, drawing from fields such as cognitive science, neuroscience, computer science, education, psychology, sociology, design studies and more,<sup>1</sup> learning science strives to understand how people learn, how to support learning, discipline-based learning, and the role of technology in enhancing learning and collaboration.<sup>2</sup> Learning science can cover how people process, gather, and interpret information; how they develop knowledge, skills, and expertise; or the extent to which social and physical context and design environments influence cognition.<sup>3</sup> Scaffolding, inquiry or problem-based learning, collaborative learning, game and simulation-based learning, metacognition are all examples of how teaching methods and approaches to curriculum can be influenced by what we understand about learning. Additionally, strategies linked to social psychology and multicultural education emphasize the importance of attending to students' identity and culture when addressing achievement gaps.

One of the goals of learning science is to create a positive feedback/continuous improvement loop between theories of learning and practice, which would result in improved student learning and advances the field of learning science.<sup>4</sup> For the purposes of the Learning Lab, as public higher education strives to educate more students with diverse backgrounds in a rapidly changing world, leveraging, increasing and applying our knowledge of human learning is a challenge we must embrace.

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<sup>1</sup> Sawyer, R.K. (2006). *The Cambridge Handbook of the Learning Sciences*. Cambridge, U.K.: Cambridge University Press.

<sup>2</sup> Sommerhoff, D., Szameitat, A., Vogel, F., Chernikova, O., Loderer, K. & Fischer, F. (2018). What Do We Teach When We Teach the Learning Sciences? A Document Analysis of 75 Graduate Programs. *Journal of the Learning Sciences*, 27:2, 319-351. <https://doi.org/10.1080/10508406.2018.1440353>.

<sup>3</sup> Ibid.

<sup>4</sup> The Simon Initiative Learning Engineering Ecosystem at Carnegie Mellon University emphasizes: 1) building and leveraging cognitive models of expertise to inform the design of effective student-centered instructional materials; 2) collecting rich data on student interactions and learning outcomes; 3) data analysis via state-of-the-art machine learning and analytic methods; 4) data-informed iterative improvement of the instructional materials; and 5) leveraging these assets to drive fresh insights in learning science.

<https://chronicle-assets.s3.amazonaws.com/5/items/biz/pdf/SimonLearningEngineeringEcosystem.pdf>.

## **2. *Why adaptive learning technologies?***

Adaptive learning is defined by statute to mean “a technology-mediated environment in which the learner’s experience is adapted to learner behavior and responses.” Adaptive learning deploys technology to better understand learner experience/learner gaps and assets and modify learning environments, pedagogical approaches and/or available resources. Adaptive learning solutions have the potential to produce better learning outcomes for students, especially those most likely to leave the sciences (such as first-generation college-going students and underrepresented students in the sciences), and to be more inclusive of those students by providing a more personalized learning experience.

## **3. *What STEM disciplines are eligible for this RFP?***

For this RFP, eligible disciplines will include biology, chemistry, physics, engineering and computational sciences, such as computer science, mathematics and statistics.

## **4. *May faculty submit Letters of Intent even if they have not yet identified or confirmed additional co-principal investigators?***

Letters of intent **should** note **expected** host institutions and co-principal investigators. We will accept, however, letters of intent for proposals where faculty have not yet identified co-PIs. Concept proposals (due January 22, 2019) **must** identify co-PIs and be accompanied by an institutional cover letter, signed by the department chair and appropriate academic administrator for each co-PI (please see section IV.C of the RFP for details on the institutional cover letter).

## **5. *May faculty/principal investigators and faculty teams submit a Concept Proposal if they were unable to submit a Letter of Intent by the January 7, 2019 deadline?***

Concept proposals will be accepted from co-PIs that were unable to provide a letter of intent by January 7. The Learning Lab includes letters of intent in the application process so as to gauge how many concept proposals to expect and to inform how many readers will be required for reviewing proposals. For this reason, the Learning Lab asks that co-PIs make every effort to provide a letter of intent by January 7, or as soon after that date as possible.

## **6. *Are faculty who teach a contextualized version of an introductory STEM course in a department outside the STEM disciplines named above eligible to apply?***

A faculty member/co-principal investigator who teaches a contextualized version of a gateway course in biology, chemistry, physics, engineering, computer science, math and statistics in a department outside of the primary disciplines named above (e.g., a psychology or economics professor who teaches an introductory statistics course) is eligible to apply. Co-PIs should be able to demonstrate that equity gaps in student performance exist in their contextualized course and that this differential success serves as a barrier to students from underrepresented groups entering the major and/or as a barrier to those students' retention and academic progress in their institution of higher education.

**7. *Why college-level lower division courses? What is considered a lower-division course? What is considered a gateway course?***

Lower division STEM "gateway" courses are often stumbling blocks for students. For the purposes of this RFP, gateway courses are understood as courses that students ordinarily take in their first or second years and that provide essential foundational knowledge for advancement in a program of study. These courses are a pre-requisite for required courses in a major and may be a pre-requisite for required courses across multiple majors, including non-STEM majors. These courses are generally highly enrolled and commonly characterized by high withdrawal and non-passage rates.

Often, when taking STEM gateway courses, students who have interest in pursuing studies in STEM become discouraged based on performance, uninspiring teaching and curriculum, or lack of connection with potential career goals. Because of the potential for large impact, the Learning Lab through this RFP seeks to incentivize the creation of accessible and welcoming foundational or gateway courses in which all students can succeed, and which will form the basis of future scientific inquiry, reasoning and evaluation regardless of a student's chosen major or career.

**8. *Is the RFP intended to address individual gateway courses or gateway course sequences? May proposals include gateway courses from multiple STEM disciplines?***

Proposals may address either a single STEM gateway course (e.g., Calculus I), or a sequence of courses (e.g., Calculus I, II and III) where that series acts as a gateway to participation in a STEM major or program of study. Proposals that address a sequence of courses should establish that the completion of the sequence is a pre-requisite for progress in a STEM major/majors and that equity gaps in student performance and/or high rates of attrition are present or develop across the sequence.

Proposals may address gateway courses in a single discipline or from multiple disciplines. Proposals that involve gateway courses from multiple disciplines should explain how the proposed project will work coherently across disciplines and how faculty will commit to

teaching and evaluating a co-developed or jointly redesigned curriculum or innovative pedagogy. For example, co-principal investigators in chemistry and physics may describe how they will apply jointly developed pedagogies and shared adaptive learning technologies in gateway courses in their respective disciplines. Proposals that bring together gateway courses from different disciplines should characterize the discipline-specific problems that co-PIS are trying to solve and/or investigate, and explain how they will address discipline-specific challenges.

***9. May proposals include pedagogical innovations that support improved learning outcomes but do not employ learning technology or other data and technology tools?***

Proposals must aim to improve learning outcomes and close equity/achievement gaps in STEM gateway courses where the mode of learning is online and hybrid. They should also incorporate learning science and demonstrate commitment to the use of robust data and technology tools to improve pedagogy and/or curriculum (see RFP, Section IV.B. Eligibility and Section IV.D. Concept Proposals).

Proposals may include other pedagogical best practices and evidence-based pedagogical innovations (e.g., supplemental instruction or the creation of communities of support) that are not necessarily technology based but are rooted in learning science. These additional practices must come, however, as part of a project that employs data and learning technology tools. The proposal should also explain how these additional practices would work with data and technology tools in improving student learning or closing equity gaps.

***10. Why intersegmental?***

The State of California invests significant resources into its public higher education institutions, as well as independent colleges and universities through the Cal Grant program. Intersegmental collaboration (i.e., collaboration across segments, such as between University of California and community college faculty, or California State University and community college faculty, or University of California and California State University faculty) will reflect proposals that draw more deeply from diverse faculty experiences with various student populations, as well as make articulation of courses more seamless and widespread adoption of successful pedagogies more likely and robust. Ideally, intersegmental faculty teams will include, STEM faculty members, social and/or behavioral scientists and instructional designers on the proposal team.

***11. What do we mean by online courses and hybrid courses?***

This RFP will take the broadest view possible in terms of what qualifies as an online or hybrid course. Generally, online courses allow students to interact, either synchronously or

asynchronously, with the course material/lecture/lab work, and other participants and/or instructors/TAs in a technology-mediated, remote environment. An online course would be one in which these are predominant modes of interaction. Hybrid courses or blended courses use both “online” and in-person interactions as part of the formal course environment or requirements, so a hybrid course would allow some component of the course to be available or accessible in an online environment as described above. Neither online or hybrid courses have to comport with the ways in which online and hybrid courses have been traditionally taught.

***12. What are the requirements regarding project timelines? Must faculty commit to teaching a redesigned curriculum or innovative pedagogy for the entirety of the award period?***

This RFP allows for flexibility with regard to timelines for each stage of the project. Co-PIs must commit to codeveloping and then teaching and evaluating their codeveloped or jointly redesigned curriculum or implementing the pedagogical innovation during the award period. Co-PIs may propose, for example, a timeline that devotes the first year of the award, or a portion of that year, to project development. The project plan should explain how the proposed timeline supports the project’s specific aims and research strategy.

***13. What can award funds be spent on?***

Award funds may be spent on expert consultants, faculty release time, other staff time (such as for graduate students), technology resources and travel that are necessary for the execution of the project, including evaluation. The project plan and budget overview should include a description of how award funds would be spent. (Travel costs will be limited according to state rules and will be included in the contract agreement.) Learning Lab funds are intended to be used exclusively in California. If the project necessitates the use of Learning Lab funds outside of California, a brief justification and estimate of the funding will need to be provided in the full proposal. The amount of funds that can be spent outside the state will be subject to the final award agreement.

***14. What intellectual property arrangements will appear in the contracts?***

Statute requires the Governor’s Office of Planning and Research to establish terms and conditions that require Learning Lab courses and course series, and technology and technology platforms developed or redesigned with Learning Lab funds, to be available as open educational resources.

***15. What information should be provided about principal investigators to establish basic qualifications and eligibility? What faculty members are eligible as principal investigators?***

These are institutional awards. Any individual with a permanent faculty appointment in the disciplines listed under item 3 above and can demonstrate institutional support for the project through commitments from their department chair AND the appropriate academic administrator (such as a dean, vice chancellor/vice president of research or provost or equivalent), may apply as a co-principal investigator. The letter of intent only requires identification of the host institutions, names of co-principal investigators and brief project information (see RFP, Section IV.A. Stage 1). Concept proposal submissions should additionally and briefly describe each PI's capacity, including any previous and/or current relevant grant funding received, strength of faculty and student engagement activities, and history of successful intersegmental partnerships (see RFP, Section IV.C.3.).

For the purposes of this RFP, the Learning Lab does not limit the definition of "permanent faculty appointment" to tenured or tenure-track faculty. The Learning Lab requires, however, that principal investigators hold an appointment that provides assurance that they will be able to oversee the proposed project for the duration of the grant. Non tenure-track faculty who hold also administrative or departmental positions or long-term contracts that provide an equivalence to permanent appointment for the duration of the grant may be eligible, provided they can also demonstrate institutional support from their department chair and appropriate academic administrator.

***16. What institutional information should be provided in the Institutional Cover Letter?***

For concept proposal submissions, please include in the institutional cover letter a brief description of institution type and size, and demographic information on both whole student population and STEM student population (e.g., proportion of underrepresented students, first-generation students, Pell grant eligibility or other low-income indicator). The institutional cover letter should be signed by the department chair AND dean, vice chancellor/vice president of research or provost or equivalent.

***17. Is there a limit on the number of proposals that may come from one institution?***

There is no limit on the number of applications that may come from or include a particular institution, provided co-principal investigators meet the institutional cover letter requirements explained in Section IV.C., Institutional Cover Letter, of the RFP. In reviewing proposals, the selection committee will consider, however, the geographic equity of awards and will seek a diversity of awarded institutions.

***18. What will be the anticipated length and scope of final "Full Proposals"?***

Additional guidance for projects that are invited to the next “Full Proposal” round will be provided. Full proposals will be limited to a maximum of 15 pages in length (not including institutional cover letter or budget information), with appendices for curriculum vitae/resume of proposed team members. Full proposals will be expected to elaborate on ideas and elements introduced in the concept proposals, and respond to questions and/or feedback from selection committee members’ evaluation of concept proposals. A strong full proposal will lay the foundation for sustainability of innovations and institutional culture change.

***19. How will money flow for awarded projects?***

Project teams should anticipate submitting invoices, based on expenditures made and according to the terms of the contract and agreed-upon budget plan. Concept proposals require a budget overview for the award range; full proposals will require a more detailed budget proposal.